



# Texas Technology 2003 Showcase Plant Energy Optimization

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Deer Park Site

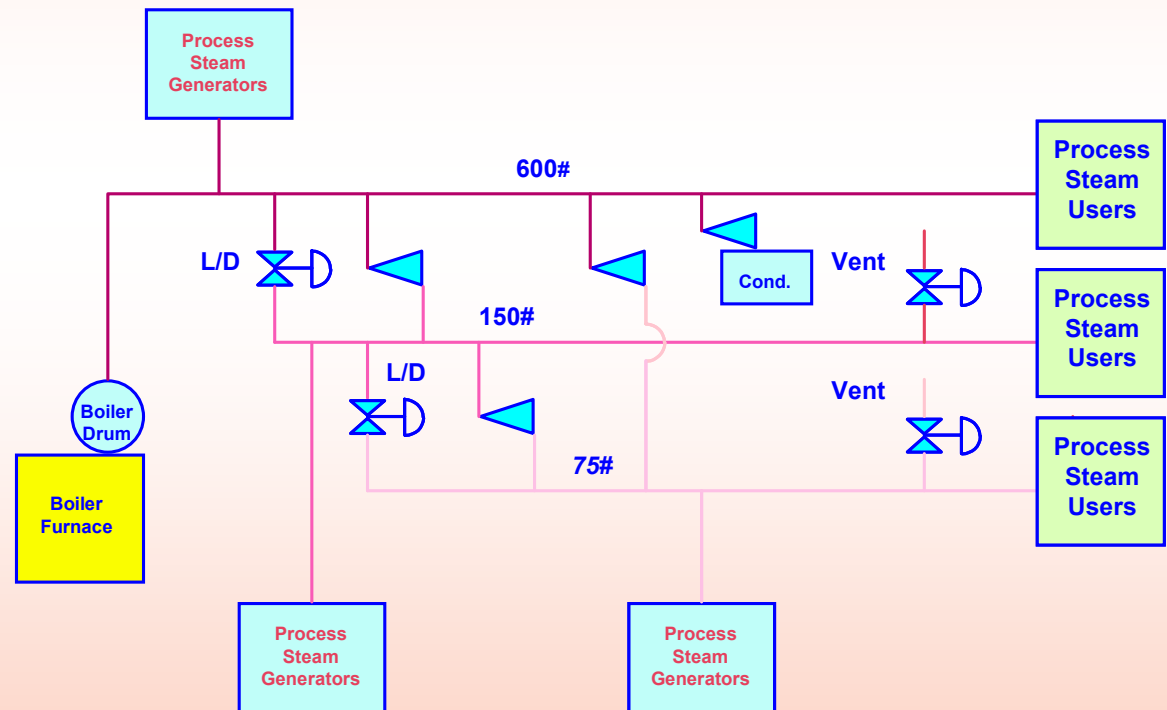


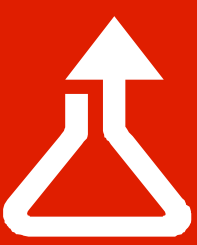
# Simplified Plant Steam System

## ■ *Three Main Header Systems*

- 600 psig
- 150 psig
- 75 psig

## ■ *Other Local Pressures*





# Plant Steam System Particulars

- ▼ 1,000,000 to 2,000,000 pounds per hour average steam generation
- ▼ Generation and consumption vary depending on unit rates
- ▼ Over 20 waste heat boilers
- ▼ Over 60,000hp of steam turbines
- ▼ One Gas Turbine with HRSG
- ▼ 2 Natural Gas Fired Boilers to maintain header pressure



# Visual MESA Selected for Plant Implementation

- ▼ Continually **Monitors** the entire Steam, BFW and Condensate systems and flags problems
- ▼ **Optimizes** the entire steam & electrical system
- ▼ Evaluates “**What If**” cases
- ▼ **Auditing and Accounting.** Validates your data and helps you with trouble shooting, auditing and accounting.



# Visual MESA Particulars for the Deer Park Plant

- ▼ Reads over 1000 tags every 3 minutes
- ▼ Optimizer runs hourly
- ▼ Resides on stand alone server
- ▼ Accessible from any desktop computer
- ▼ Plant data feeds from 9 separate  
Distributed Control Systems



# Plant Energy Optimization Benefits

- ▼ Letting down and venting significantly reduced with 24/7 attention.
- ▼ Monitoring condensate return allows more to be returned. Diversions have to be manually switched back and this is sometimes forgotten.
- ▼ Turbine vs motor switching can be called correctly much sooner with better cost data.
- ▼ The “lost opportunity trend” tracked hourly will give increased attention by all to the overall energy system.



# Plant Energy Optimization Benefits

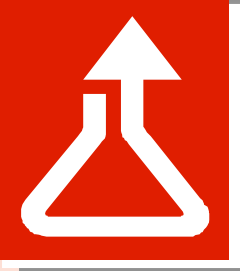
- ▼ Corrective actions to the system that have been difficult to fund in the past have a much better basis for funding.
- ▼ The graphical representation of the steam system allows a much larger group of people to gain familiarity with the system.
- ▼ Meter inaccuracies can be identified and scheduled for corrective action.



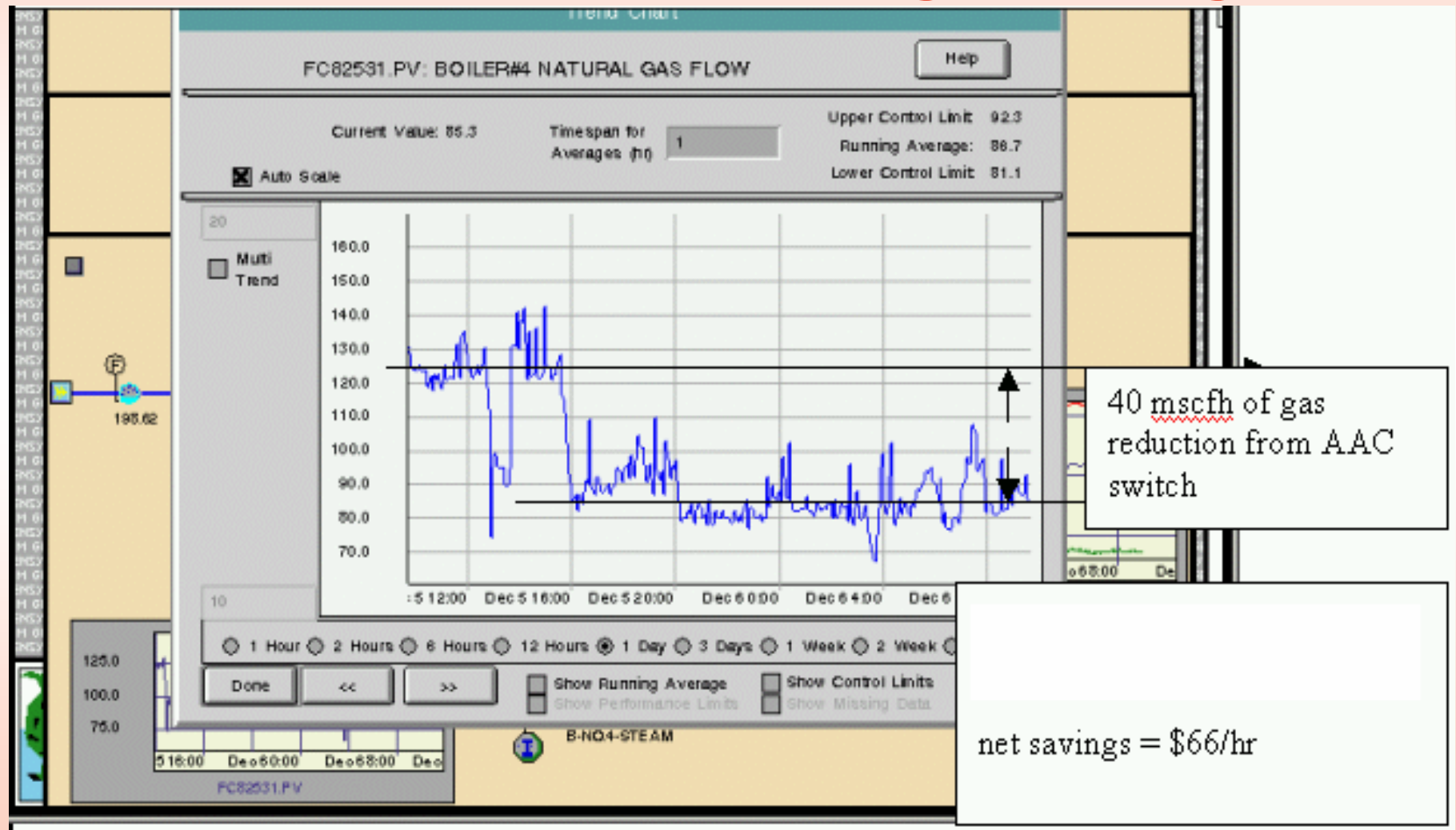
# Plant Energy Optimization Benefits

- ▼ Detailed balances within each unit can be understood and corrected with potential energy improvement projects resulting.
- ▼ Shutdown and production planning can be evaluated from an energy perspective.
- ▼ The effect of rapidly changing natural gas and energy costs can easily be quantified.





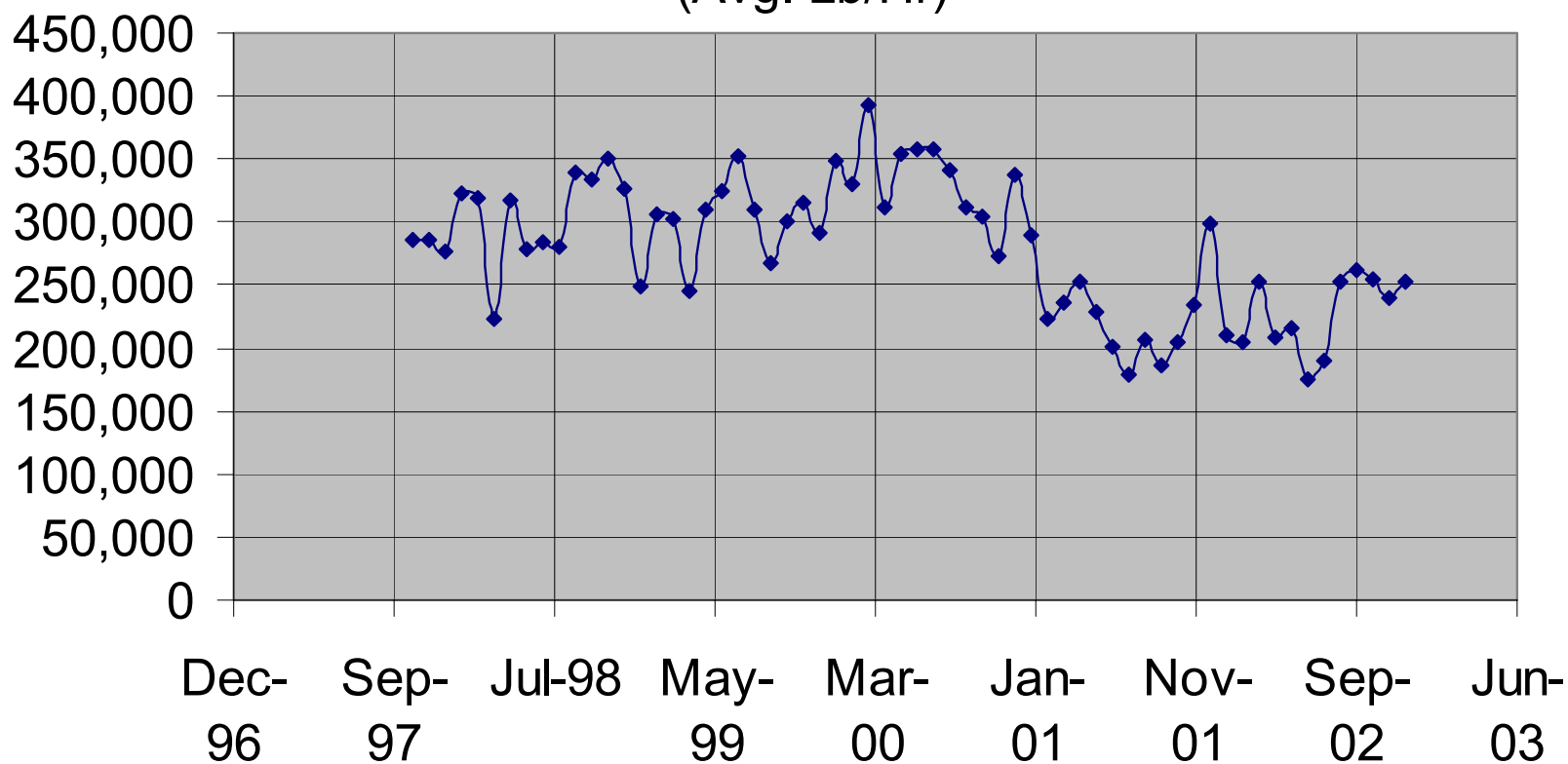
# Example of Turbine/Motor Switch Showing Savings





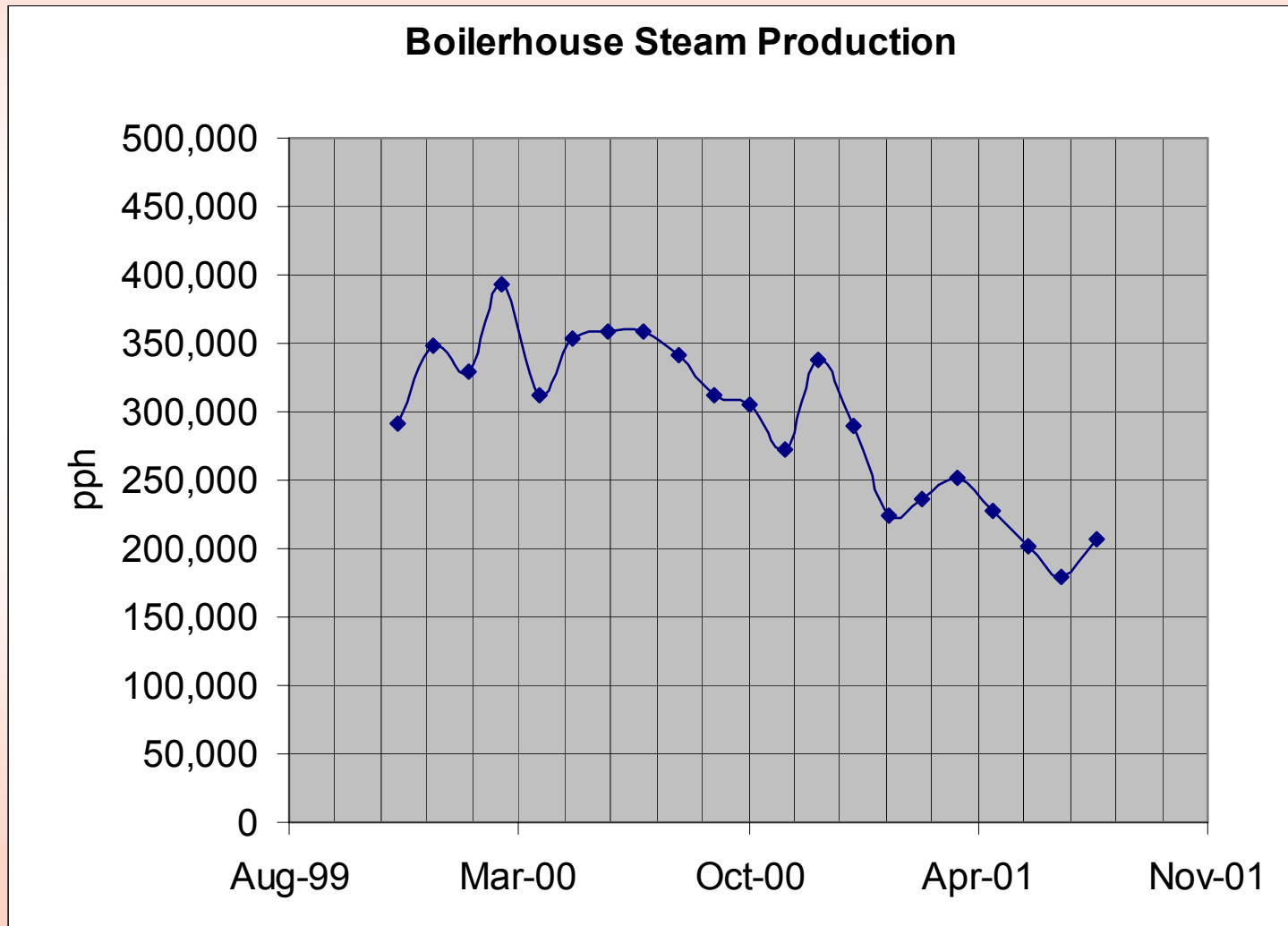
# Plant Optimization System Operational in June 2000

Boiler House Steam Production to Balance Plant  
(Avg. Lb/Hr)



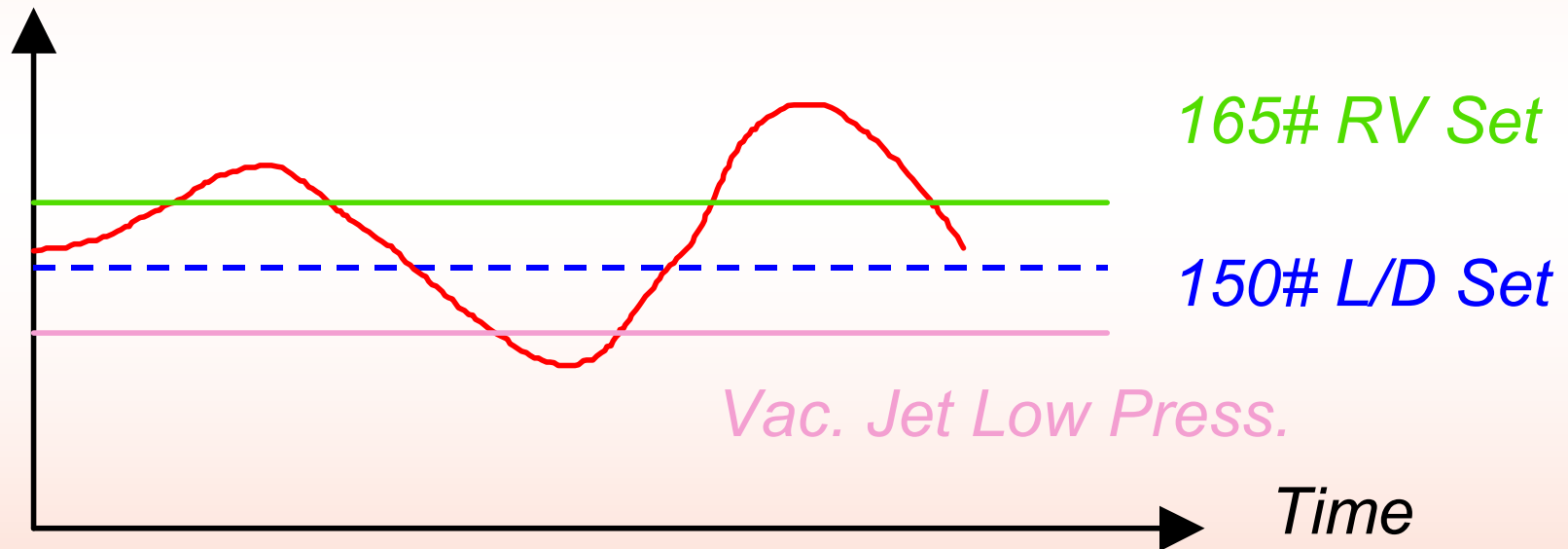


# Fired Steam Production Drops After June 2002 Implementation





# 150# Header Narrow Band of Pressure Control





# Customized Report Selection

Visual-MESA-ONLINE

File Mode View Mesa Builder ONLINE Status: COMPLETE View: CURRENT RESULTS

#278435 1

### REPORTS

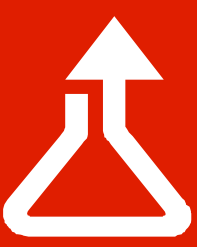
Rohm & Haas

12 Jun 2002 4:11:31 p.m.

- ☒ STEAM-SYSTEM-OPTIMIZATION-REPORT
  - ☐ Enter Fuel, Electricity Prices, and Natural Gas Heating Value
  - ☐ Enter information for HT-4500
- ☒ PUMP-STATUS-DATA-ENTRY
- ☒ STEAM-PRODUCTION-SUMMARY
- ☒ STEAM-CONSUMPTION-SUMMARY
- ☒ CONDENSATE-RECOVERY
- ☒ TURBINE-REPORTS
- ☒ STEAM-MARGINAL-COSTS
- ☐ Acrylates Process Flows
- ☐ N-Area and HR-B3 Process Flows
- ☐ Propylene Feed Optimization

**Process Flow Diagrams:**

- NORTH:** Shows a green circle with 'E' and a value of 46.34, and a green circle with 'E' and a value of -44.81. A red line connects them, and a purple line connects to a box labeled 'NORTH'.
- SOUTH:** Shows a green circle with 'E' and a value of 66.35. A red line connects it to a box labeled 'SOUTH'.
- BOILER-HOUSE:** Shows a green circle with 'E' and a value of -77.72, and a green circle with 'E' and a value of 44.93. A red line connects them, and a purple line connects to a box labeled 'SOUTH'.
- PROCESS-FLOW-CORRELATIONS:** Shows a green circle with 'E' and a value of 66.35.



# Challenges

- ▼ Developing master flow diagrams of the steam system from the thousands of Process & Instrument Diagrams
- ▼ Keeping network connectivity reliable
- ▼ Determining how to respond to recommended changes
- ▼ Getting and keeping meters working – primary element and configurations/spans/tag id's/etc.



# Obstacles & Lessons Learned

- ▼ It's more complicated than it appears.
- ▼ If you do not have the appropriate handwheels, you can't respond to every opportunity.
- ▼ Fixing one problem can create another problem due to equipment/process inter-relationships and constraints in the system.
- ▼ Makes an excellent learning tool for the steam system.
- ▼ Core group of people need to understand the software - They must take on communicating and training of others.



# Obstacles & Lessons Learned

- ▼ The effort must be supported by management and have a champion
- ▼ Certain items will need to be “purchased” above and beyond the software – key flowmeters on letdowns, vents, and import/export to complex areas.
- ▼ Interface with IT department is mandatory





# Future Plans

- ▼ Build Natural Gas model into Steam model
- ▼ Connect production planning to the model
- ▼ Add other Utilities like nitrogen and instrument air to the model
- ▼ Convert data server to Aspen IP-21
- ▼ Configure more detail into the model
- ▼ Provide graphical interface to DCS system to put information in front of operators